

REMARKS

Claim Status

Applicants acknowledge, with appreciation, the indication that claims 13-20, 24 and 25 contain allowable subject matter, and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. New independent claim 26 has been added. Claims 1-26 are now pending, with claims 1, 2 and 26 being in independent form. No new matter has been added. Reconsideration of the application, as amended, is respectfully requested.

Overview of the Office Action

Claims 2, 9 and 10 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,869,813 (“*Okazaki*”). Claims 1, 3, 4, 6, 7 and 21-23 stand rejected under 35 U.S.C. §103(a) as unpatentable over *Okazaki* in view of U.S. Patent No. 6,861,281 (“*Uemura*”). Claim 8 stands rejected under 35 U.S.C. §103(a) as unpatentable over *Okazaki* in view of U.S. Patent No. 6,614,103 (“*Durocher*”). Claims 5 and 12 stand rejected under 35 U.S.C. §103(a) as unpatentable over *Okazaki* in view of *Uemura*, and in further view of U.S. Patent No. 6,787,435 (“*Gibb*”). Lastly, claim 11 stands rejected under 35 U.S.C. §103(a) as unpatentable over *Okazaki* in view of *Uemura*, and in further view of U.S. Patent No. 6,410,980 (“*Tsuji*”).

Applicants have carefully considered the Examiner’s rejections, and the comments provided in support thereof, and respectfully disagree with the Examiner’s analysis. For the reasons which follow, it is respectfully submitted that all claims of the present application are patentable over the cited references.

Summary of Subject Matter Disclosed in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

A process is disclosed for simultaneously producing a plurality of light-emitting diode light sources of the same kind, each comprising a light-emitting diode chip and a luminescence conversion element, which converts the wavelength of at least part of an electromagnetic radiation emitted by the light-emitting diode chip.

A layer composite comprising a light-emitting diode layer sequence applied to a carrier substrate is provided for the plurality of light-emitting diode chips. A plurality of trenches are produced in the layer composite. The layer composite is then inserted into a cavity of a mold, into which a molding compound is driven in a further step. This molding compound has mixed with it a luminescence conversion material and is driven into the cavity in such a way that the trenches are at least partly filled with the molding compound. The mold is then removed and the light-emitting diode light sources are separated from the layer composite (see paragraph [0009] of the originally filed specification).

In an aspect of the invention, the luminescence conversion material is applied substantially simultaneously to the light-emitting diode chips by means of a molding technique before the chips are mounted on a housing or housing part (see paragraph [0008] of the originally filed specification).

In another aspect of the claimed invention, a plurality of light-emitting diode chips, which are fitted to a common carrier in a regular arrangement, are provided. These are inserted into a cavity of a mold, into which a molding compound with which a luminescence conversion material

is mixed is subsequently driven. The molding compound is driven into the cavity such that free space in the cavity is at least partly filled with the molding compound. The mold is then removed and the light-emitting diode light sources are separated (see paragraph [0017] of the originally filed specification).

Patentability of the independent claims over the Prior Art under 35 U.S.C. §102

The Examiner (pg. 2) of the Office Action contends that:

Okazaki discloses, *inter alia*, inserting the light emitting diode chips (1) into a cavity (13) of a regular arrangement ... (Fig. 7, 8a & 8b; col. 10, lines 40-67).

With respect to the foregoing statement, Applicants respectfully assert that *Okazaki* fails to teach this limitation. *Okazaki* (Figs. 8A and 8B) show that the light-emitting diode chips are not mounted into a cavity of the housing 4. Rather, *Okazaki* clearly shows that the light-emitting diode (LED) chips are mounted at a distance from the cavities of the mold 14. Moreover, *Okazaki* (col. 10, lines 49-54) states “the vessel 4 integrated with the first and second lead frames 3a and 3b, the LED element 1 and the gold wire 2 is closely adhered to a mold 14 having a concave portion 13 corresponding to the shape of the convex lens portion such that the upper opening 9 of the vessel 4 is closed by the concave portion 13 of the mold 14”. Thus, *Okazaki* teaches that two components, i.e., the vessel 4 and the mold 14, are adhered together. The upper component, i.e., housing or vessel 4 contains the LED chip, while the lower component, i.e., mold 14 is located at a distance from the LED chip. In this configuration, not even the housing or the molding 4 is inserted into the cavity or opening 9 of the mold 14. Rather, the housing or vessel 4, which itself contains the LED, is closely adhered to the mold 14. In view of the foregoing, Applicants respectfully assert that *Okazaki* fails to anticipate independent claim 2. Therefore, reconsideration and withdrawal of the rejection under 35 U.S.C. §102 are in order, and a notice to that effect is earnestly solicited.

Moreover, due to the fundamental above-discussed difference between the claimed invention and *Okazaki*, it is clear that claim 2 is patentable over this reference under 35 U.S.C. §103. It would not have been obvious to modify the process disclosed in *Okazaki* such that the LED chips are inserted into the cavity of a mold. In view of the teachings of *Okazaki*, such a configuration would only be possible if the complete housing or vessel 4 were inserted into the opening 9 of the mold 14. However, such a configuration is inconsistent with the teachings of *Okazaki*.

In addition, *Okazaki* (col. 10, lines 55-64; Fig. 8(a) & 8(b)) discloses a complicated and sensitive process, wherein a predetermined amount of light-transmissive resin 7 is first added dropwise into the vessel 4 and cured. A predetermined amount of light-transmissive resin containing a fluorescent material is then added dropwise into the vessel 4 and cured. Finally, the light-transmissive resin 7 is added through the lower opening to completely fill the vessel. In each instance, the resin must be added dropwise to control the predetermined amount of resin that is added to the vessel and to also control the shape of the respective resin bodies that are formed. *Okazaki* (Fig. 8(a)) illustrates a configuration at the beginning of the process for manufacturing a chip-type LED. Fig. 8(b) is an illustration of the chip-type LED after completion of the manufacturing process. *Okazaki* (Fig. 8(a)) clearly shows that the LED chip is not inserted into the concave portion of the mold during the manufacturing process. The process disclosed in *Okazaki* simply could not be implemented if the LED were inserted in the cavity of the mold.

Furthermore, a person skilled in the art would not be motivated to modify the process taught by *Okazaki* such that the diode chips are inserted into the cavities of the mold, and it would not have been obvious to do so because such a modification would lead to complications in attempting to implement the process disclosed therein.

Finally, the process of claim 2 is better suited for use during mass production than the process taught by *Okazaki*. While *Okazaki* discloses a process that utilizes a multitude of cavities and dropwise adds resin into each of the cavities, during the present claimed process the light emitting diodes are inserted into a cavity of a mold and a molding compound is then driven into the cavity. The claimed driving step can be performed, e.g., by transfer molding (see paragraph [0044], lines 4-7), which cannot be used in the process disclosed in *Okazaki*. For the foregoing reasons, claim 2 is patentable over this *Okazaki* under 35 U.S.C. §103.

Claim 1 and new independent claim 26 are likewise patentable over *Okazaki* under 35 U.S.C. §102 and §103 for reasons presented above with respect to claim 2.

Patentability of the independent claims over the Prior Art under 35 U.S.C. §103

The Examiner (pg. 4) of the Office Action states:

[I]t would have been obvious to one of ordinary skill in the art at the time the invention was made to modify *Okazaki* by providing a layer composite with a light-emitting diode layer sequence applied to a carrier substance for the plurality of light emitting diode chips; and producing a plurality of trenches in the layer composite as taught by *Uemura et al.* to improve productivity (col. 1, lines 37-50).

For the following reasons, Applicants respectfully assert that a person with ordinary skill in the art would not seek to combine the teachings of *Okazaki* with *Uemura* in order to obtain the invention recited in independent claim 1.

Okazaki teaches that LED chips 1 are each mounted into separate pre-housed leadframes, i.e., vessel 4 (see Figs. 4(a), 4(b), 8(a) and 8(b)). The LED chips are each electrically connected to the leadframe, which includes the use of a bonding wire 2, before the diode chips are surrounded by the resin 7. The replacement of the light-emitting diode chips 1 taught in *Okazaki* by the light emitting diode layer sequence taught by *Uemura* would be counter intuitive to one skilled in the art.

Moreover, a light emitting diode layer sequence comprising a plurality of light emitting chips connected to each other would not fit into the cavities of the pre-housed leadframe (i.e., the vessel 4) taught in *Okazaki*. Furthermore, even assuming *arguendo* that it were possible to mount a complete LED layer sequence for a plurality of LED chips into the cavity of the vessel, it would not be possible to separate the LED light sources from the layer composite without destroying both the housing and the leadframe. Absent an impermissible hindsight reconstruction based on Applicants' own teachings in the instant application, a person skilled in art would not combine *Okazaki* and *Uemura* to achieve the invention recited in independent claim 1. For at least these reasons, Applicants assert that the combination of *Okazaki* and *Uemura* is improper and inadequate and, in any event, fails to render independent claim 1 obvious over the cited art. Therefore, reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) are respectfully solicited.

The Examiner has combined *Okazaki* with *Durocher* to reject dependent claim 8. The Examiner has also combined *Gibb* with *Okazaki* and *Uemura* to reject dependent claims 5 and 12. Lastly, the Examiner has combined *Tsuji* with *Okazaki* and *Uemura* to reject claim 11. However, it is clear that *Durocher*, *Gibb* and/or *Tsuji*, applied singly or in combination, fail to bridge the above-discussed gaps between the claimed configuration recited in independent claims 1 and 2. Accordingly, independent claims 8, 5, 11 and 12 are patentable over the combination of *Okazaki*, *Uemura*, *Durocher*, *Gibb* and/or *Tsuji* based on their various dependencies on claim 1 or 2. Therefore, reconsideration and withdrawal of the rejections under 35 U.S.C. §103(a) are respectfully requested, and a notice to that effect is earnestly solicited.

Claim 26 includes the additional feature that the LED chips are inserted into a cavity of a mold without being mounted on a housing. That is, the LED chips are not mounted on a housing during the process of inserting the LED chips into a cavity of a mold. Support for this feature of

independent claim 26 may be found at paragraph [0008] of the originally filed specification. In contrast, *Okazaki* teaches a process that would not work without the use of the vessel 4 (i.e. the housing). Therefore, new independent claim 26 is likewise patentable under 35 U.S.C. §103 over the combination of the cited references for this additional reason.

Dependent claims


In view of the patentability of independent claims 1 and 2, for the reasons presented above, each of dependent claims 3-25 is patentable therewith over the prior art. Moreover, each of these claims includes features which serve to even more clearly distinguish the invention over the applied references.

Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,
COHEN, PONTANI, LIEBERMAN & PAVANE

By 
Thomas Langer
Reg. No. 27,264
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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